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The issue before us is a direct result of the fact that we allow users to report what percentage of the treatment unit is in what condition class. (One of the problems I have is that this doesn't make sense to me, but I am going to try and set that aside for right now). What we have to do is arrive at a method of calculating the change in condition class for treated areas. I see only two options.

Definitions:

Actual Pretreatment Condition Class - is the last condition class observation for the treatment unit being treated with an observation date that is less than or equal to the actual initiation date of the treatment where

- BP1 = Percent of the Treatment Unit in Condition Class 1
- BP2 = Percent of the Treatment Unit in Condition Class 2
- BP3 = Percent of the Treatment Unit in Condition Class 3

Actual Posttreatment Condition Class - is the last condition class observation for the treatment unit being treated on the first observation date that is greater than or equal to the actual completion date of the treatment where

- AP1 = Percent of the Treatment Unit in Condition Class 1
- AP2 = Percent of the Treatment Unit in Condition Class 2
- AP3 = Percent of the Treatment Unit in Condition Class 3

CC3TOCC2ORCC1 = Acres Moved from Condition Class 3 to Condition Class 2 or Condition Class 1

CC2TOCC1 = Acres Moved from Condition Class 2 to Condition Class 1

MTBCC = Acres Moved to a Better Condition Class where

$$MTBCC = CC3TOCC2ORCC1 + CC2TOCC1$$

TA = Treated Area (i.e. Actual Acres)

Example:

Assume we have a 100 acre treatment unit that was treated mechanically. The treatment was initiated on November 1, 2002 and completed on January 23, 2003. A total of 100 acres were treated. The treatment unit had the following condition class observations:

Observation Date	Percent CC1	Percent CC2	Percent CC3
July 2, 2002	0	80	20
August 15, 2003	30	40	30

Option 1 - Proportional

$$\begin{aligned} \text{CC3TOCC2ORCC1} &= ((\text{BP3} / 100) * \text{TA}) - ((\text{AP3} / 100) * \text{TA}) \\ &= ((20 / 100) * 100) - ((30 / 100) * 100) \\ &= - 10 \text{ acres} \end{aligned}$$

$$\begin{aligned} \text{CC2TOCC1} &= (((\text{BP3} / 100) * \text{TA}) + ((\text{BP2} / 100) * \text{TA})) - (((\text{AP3} / 100) \\ * \text{TA}) + ((\text{AP2} / 100) * \text{TA})) \\ &= (((20 / 100) * 100) + ((80 / 100) * 100)) - (((30 / \\ 100) * 100) + ((40 / 100) * 100)) \\ &= 30 \text{ acres} \end{aligned}$$

$$\text{MTBCC} = -10 + 30 = 20 \text{ acres}$$

Option 2 - Predominant

CCB = Average Condition Class Before Treatment (round to the nearest integer)

$$\text{where CCB} = ((\text{BP1}/100) * 1) + ((\text{BP2}/100) * 2) + ((\text{BP3}/100) * 3)$$

CCA = Average Condition Class After Treatment (round to the nearest integer)

$$\text{where CCA} = ((\text{AP1}/100) * 1) + ((\text{AP2}/100) * 2) + ((\text{AP3}/100) * 3)$$

B1 = Acres in Condition Class 1 Before Treatment  
If CCB is 1 then B1 = TA Else B1 = 0

B2 = Acres in Condition Class 2 Before Treatment  
If CCB is 2 then B2 = TA Else B2 = 0

B3 = Acres in Condition Class 3 Before Treatment  
If CCB is 3 then B3 = TA Else B3 = 0

A1 = Acres in Condition Class 1 Before Treatment  
If CCA is 1 then A1 = TA Else A1 = 0

A2 = Acres in Condition Class 2 Before Treatment  
If CCA is 2 then A2 = TA Else A2 = 0

A3 = Acres in Condition Class 3 Before Treatment  
If CCA is 3 then A3 = TA Else A3 = 0

Comment: The results of these formula are a 1, 2 or 3 and together they will report if the are treated was altered enough to move the entire area from one condition class to another.

$$\begin{aligned} \text{CCB} &= ((0/100) * 1) + ((80/100) * 2) + ((20/100) * 3) \\ &= 0 + 1.6 + 0.6 \\ &= 2.2 \\ &= 2 \end{aligned}$$

$$\begin{aligned} \text{CCA} &= ((30/100) * 1) + ((40/100) * 2) + ((30/100) * 3) \\ &= 0.3 + 0.8 + 0.9 \\ &= 2.0 \\ &= 2 \end{aligned}$$

B1 = 0  
B2 = 100  
B3 = 0

A1 = 0  
A2 = 100  
A3 = 0

$$\begin{aligned} \text{CC3TOCC2ORCC1} &= \text{B3} - \text{A3} \\ &= 0 \end{aligned}$$

$$\begin{aligned} \text{CC2TOCC1} &= (\text{B3} + \text{B2}) - (\text{A3} + \text{A2}) \\ &= (0 + 100) - (0 + 100) \\ &= 0 \end{aligned}$$

$$\text{MTBCC} = 0 + 0 = 0$$

As for Acres moved to a worse condition class I only see one option ... exclude all treatments that have a negative MTBCC. The reason I say this is that within the treated area we have no idea what acres got better or worse. There is no way we can apply logic to the percents in each condition class before and after treatment and exclude acres that have moved to a worse condition class before doing the MTBCC calculation. To illustrate this, using the example above, we cannot distinguish the following two cases:

Case 1 - The 20 acres that were in condition class 3 remained in condition class 3 and 10 acres moved from condition class 2 to condition class 3, and 30 acres moved from condition class 2 to condition class 1.

Case 2 - The 20 acres that were in condition class 3 moved to condition class 1. Thirty acres that were in condition class 2 moved to condition class 3 and 10 acres moved to condition class 1.